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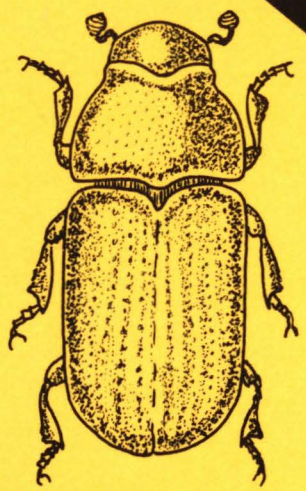
BIOLOGICAL EVALUATION
Mountain Pine Beetle in Ponderosa Pine

Jicarilla Indian Reservation
New Mexico

1981



Southwestern Region

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1981

Forest Pest Management
State and Private Forestry
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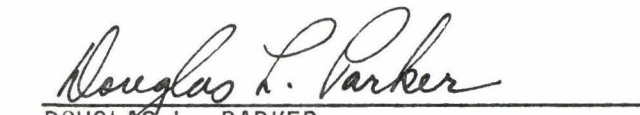

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ABSTRACT

A mountain pine beetle, Dendroctonus ponderosae Hopk., infestation in ponderosa pine on the Jicarilla Indian Reservation was evaluated during February 1981 by Forest Pest Management personnel. Variable plots were established and data collected regarding stand composition and structure, incidence, cause, and year of mortality.

Approximately 700 to 1,000 ponderosa pines were attacked and killed by mountain pine beetle in 1979. These were large, overmature ponderosa pine. Only one 1980-attacked ponderosa pine was observed, indicating a significant reduction in the beetle population. The remaining green stand has a relatively low susceptibility to mountain pine beetle attack in the near future.

Management alternatives and recommendations are discussed.

INTRODUCTION

A localized mountain pine beetle infestation was observed in ponderosa pine on Archuleta Mesa, Jicarilla Indian Reservation, during aerial detection surveys conducted October 14, 1980. In response to a project proposal submitted by the Bureau of Indian Affairs for mountain pine beetle suppression, a biological evaluation of the infestation was conducted in February 1981.

The objectives of the evaluation were to:

1. Verifiy the cause of mortality.
2. Estimate the amount of mortality.
3. Determine general trend of infestation.
4. Obtain stand structure data.

This report summarizes the information collected during the evaluation, lists management alternatives, and presents recommendations.

TECHNICAL INFORMATION

Insect.--Mountain pine beetle, Dendroctonus ponderosae Hopk.

Host.--Ponderosa pine, Pinus ponderosae Laws.

Life History.--The mountain pine beetle has one generation per year. Adults attack trees from mid-July through early September. Large, overmature trees are preferred, but smaller trees are occasionally killed. The attacking beetles bore through the bark to the cambium, then tunnel upward to construct an egg gallery. The females lay eggs in individual niches along each side of the gallery which is then packed with frass. Small larvae hatch from eggs in 1 to 2 weeks and feed in individual galleries. They overwinter as larvae and resume feeding and development in the spring. When fully mature, the larvae excavate an oval pupal chamber in which they transform into pupae and then adults. The adults bore out through the bark and attack new trees, completing the generation.

Signs of Infestation.--Pitch tubes on the trunk of live trees are the first sign of mountain pine beetle attack. These are cream-colored to dark red masses of resin, mixed with boring dust, and are ¼ to ½ inch in diameter. Larger, cream-colored pitch tubes widely scattered over the bole indicate that beetle attacks were unsuccessful or "pitched out." Boring dust in bark crevices and around the tree base and discoloration of the sapwood caused by the blue-stain fungi that are carried into the trees by the beetles are additional indications of attack.

The needles of attacked trees may remain green for several months. Trees attacked in August usually do not begin to fade (green needles turn yellow then brown) until April or May.

Location and Extent of the Infestation.--As observed from aerial detection surveys, the infestation consists of approximately 700 to 1,000 "faders" (pines that were attacked in 1979) in scattered groups over portions of four sections on Archuleta Mesa. The majority of the infestation is limited to Sections 12 and 13 in Township 32 North, Range 2 West (Fig. 1). Additional isolated pockets of faders occur on adjacent Ute Indian Reservation lands, Colorado, and on Bureau of Land Management lands, New Mexico.

METHODS

A portion of the infestation was sampled to obtain data on stand composition and structure, incidence, cause, and year of mortality. Ten variable (BAF 20) plots were established on a 5- by 5-chain spacing. Trees within the plots were recorded to the following designations: green (unattacked), current (1980) attack, previous year's attack (faders), older dead (snags), strip attack, unsuccessful attack (pitchout), or other mortality. All species were tallied by diameter. Heights of the first three trees in each plot were recorded for volume estimations. Regeneration data were obtained from 1/300-acre plots established at the center of each variable plot. Data were analyzed using the computer program INDIDS (Bousfield 1980).

RESULTS AND DISCUSSION

The surveyed stand was two-storied ponderosa pine with an average basal area of 94 square feet per acre and an average d.b.h. of 11.1 inches. White fir was present as a minor component of the stand.

Tree mortality was primarily a result of mountain pine beetle attacks that had occurred in and prior to 1979. These dead trees, averaging 3.5 per acre, represented a basal area of 12.0 square feet per acre. The majority of the dead trees were large, overmature ponderosa pine ranging from 23 to 31 inches in diameter at breast height. One currently infested tree was observed during the evaluation; however, it did not occur within the survey plots.

CONCLUSIONS

Most of the mountain pine beetle activity and resultant ponderosa pine mortality occurred during 1979. This mortality was limited to large,

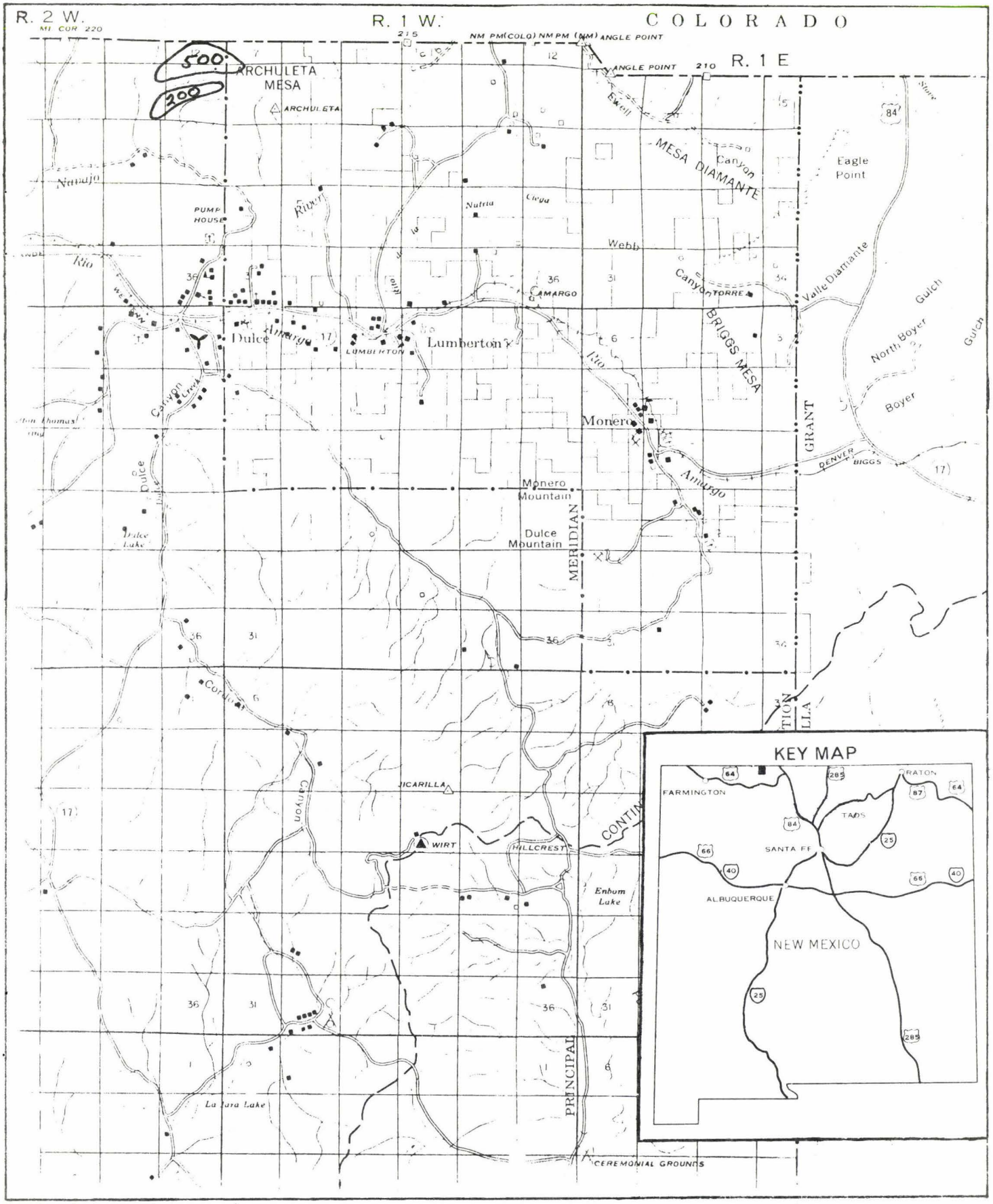

Figure 1. Location and approximate number of ponderosa pine "faders," Jicarilla Indian Reservation, New Mexico, 1980.

overmature trees. The remaining stand is two-storied ponderosa pine with a basal area of approximately 82.0 square feet per acre and an average d.b.h. of 12.3 inches. Stands such as this are usually considered low risk and seldom sustain mountain pine beetle infestations.

Due to the low susceptibility of the remaining stand and to the absence of current year's attacks, additional tree mortality in the near future will be minimal and limited to widely scattered pockets of overmature, decadent ponderosa pines.

MANAGEMENT ALTERNATIVES

The following management alternatives are recommended when dealing with mountain pine beetle in ponderosa pine:

1. Individual Tree Treatment.--Individual tree treatment, such as fall and burn, fall and peel, or treatment with a chemical, may slow a mountain pine beetle infestation, but will not stop it. The dead trees are not utilized and the stand susceptibility remains unchanged. In addition, the costs of conducting a presuppression survey to locate the infested trees, combined with the costs of treatment, may far outweigh the value of the lost timber. This treatment is most often used in areas with high-value trees, such as recreation sites where it is desirable to protect the quality of the site.

2. Sanitation-Salvage Logging.--This approach can be used to suppress low-level infestations where "valuable" pine stands are threatened. Some beetles are removed; the dead trees are utilized; and by selectively removing large, overmature trees until the basal area is reduced below 60 to 100 square feet per acre (depending on site index), the stand susceptibility can be reduced. However, as in Alternative 1, the administrative costs could be high and may not be justified.

3. Salvage Logging.--This alternative is restricted to harvesting easily accessible dead, faded, and currently infested trees. Administrative costs are low due to the ease of locating dead trees; however, the infestation is not suppressed nor is the stand susceptibility reduced, hence, future losses must be expected.

4. Silvicultural Management.--In this alternative, management plans would include silvicultural prescriptions to reduce stand susceptibility and maintain stand densities at or below 80 square feet of basal area per acre, depending on site index. Large diameter, overmature trees would be removed first.

5. Do Nothing.--In some instances, the manager may decide to allow the outbreak to progress naturally and accept tree losses when (a) the cost of alternatives outweigh the benefits, (b) effective techniques are not available, (c) environmental effects or alternatives are unacceptable, or (d) alternatives conflict with other management objectives (Parker 1980).

RECOMMENDATIONS

Based on the conclusions that the beetle population is at a low level and that losses in the near future will be minimal, we recommend salvage logging in easily accessible areas. Elsewhere, no short-term action is recommended.

For long-term action to prevent future losses, large, continuous, sawtimber-size ponderosa pine stands should be converted to younger, more vigorous, or mixed species stands. This can be accomplished by removing the larger, overmature ponderosa pine and keeping the basal area of the stand less than 80 square feet per acre.

REFERENCES

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